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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/694,465

10/27/2003

Gregg M. Gallatin

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DELIO & PETERSON, LLC
121 WHITNEY AVENUE
NEW HAVEN, CT 06510

EXAMINER

PATEL, SHAMBHAVI K

ART UNIT

PAPER NUMBER

2128

DATE MAILED: 09/18/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/694,465	Applicant(s) GALLATIN ET AL.	
	Examiner Shambhavi Patel	Art Unit 2128	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 October 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-30 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-30 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>10/27/03</u> . | 6) <input type="checkbox"/> Other: _____ |

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DETAILED ACTION

Claims 1-30 are pending.

Information Disclosure Statement

The information disclosure statement (IDS) submitted on 27 October 2003 is in compliance with the provisions of 37 CFR 1.97. Accordingly, the Examiner has considered the IDS as to the merits.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

1. **Claims 1-30 are rejected under 35 U.S.C. 101** because the claimed invention is directed to non-statutory subject matter. The Examiner asserts that the current state of the claim language is such that a reasonable interpretation of the claims would not result in any useful, concrete or tangible product. Regarding claims 1 and 27, performing optical proximity correction calculations does not produce a tangible result. Regarding claims 26, computing an aerial image with aberrations does not produce a tangible result. All other claims are rejected by virtue of their dependency.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

2. Claim(s) 1-3, 20-21, and 27-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Baggenstoss et al. (US Patent No. 6,374,396) in view of Neureuther et al. (US Patent No. 7,030,997), herein referred to as 'Baggenstoss' and 'Neureuther', respectively.

Regarding claims 1 and 27:

Baggenstoss is directed to performing model-based optical proximity correction comprising:

- a. embedding wavefront information on a first two-dimensional complex array having a plurality of array elements and an assigned diameter (column 5 lines 38-40: Zernike coefficients (*wavefront information*) have x, y coordinates (2D))
- b. computing a point spread function (column 5 lines 36-37: Zernike polynomial (*point spread function*)). The function results from the wavefront data.
- c. performing optical proximity correction calculations using said point spread function (column 6 lines 5-15)

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Baggenstoss does not explicitly disclose generating a phase map from the wavefront information. Neureuther teaches generating a phase map from the wavefront information (**Neureuther: figure 31A**). At the time of the invention, it would have been obvious to one of ordinary skill in the art to combine the teachings of Baggenstoss and Neureuther because the method disclosed by Neureuther reduces the spillover effects that degrade the image quality with position within the field of die (**Neureuther: background**).

Regarding claims 2 and 28:

The combination of Baggenstoss and Neureuther as applied to claim 1 above teaches embedding simulated wavefront information from randomly generated data (**Neureuther: figure 38; column 5 lines 6-9**).

Regarding claims 3 and 29:

Baggenstoss is directed to claim 1 wherein embedding wavefront information comprises embedding empirically derived wavefront data (**column 5 line 42**).

Regarding claim 20:

Baggenstoss and Neureuther do not explicitly disclose reading the empirically derived wavefront in a row major order by substituting zero for ignored data and centering said empirically derived wavefront data. However, a skilled artisan would knowingly include this functionality in order to track which elements have been used and which ones remain unused.

Regarding claim 21:

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Baggenstossis and Neureuther do not explicitly disclose obtaining a circle enclosing said empirically derived wavefront data; and embedding and centering said circle within a square array such that said circle has a diameter represented by an equal number of rows and columns of said array expressed as a value equal to 2 raised to the power of the log of the sum of said diameter plus one. However, a skilled artisan would knowingly implemented an array length of 2 raised to the power of the log of the sum of said diameter plus one because performing Fourier transformations on an array with a length $= 2^v$, will simplify the calculations. (this decimation can be performed $v = \log_2 N$ times. Thus the total number of complex multiplications is reduced to $(N/2)\log_2 N$).

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. **Claim 26 is rejected under 35 U.S.C. 102(b)** as being clearly anticipated by **Wong et al. (US Patent No. 6,223,139)**.

Regarding claim 26:

Wong is directed to method of performing model based optical proximity correction **(column 2 line 1)** on a lithographic mask pattern incorporating phase maps comprising: incorporating a point spread function array in real dimension **(column 3 lines 51-52: array**

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analogous to the characteristic matrix in the prior art) within a set of convolution kernels (column 3 line 55); and computing an aerial image with aberrations using said set of convolution kernels (column 3 lines 52-57). The characteristic matrix is inverted to obtain eigenvalues or eigenvectors, and these are convolved with the mask patterns to form the aerial images.

Allowable Subject Matter

4. Claims 4-19, 22-25, and 30 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims as well as overcoming the 101 rejection.


Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shambhavi Patel whose telephone number is (571) 272-5877. The examiner can normally be reached on Monday-Friday, 8:00 am – 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kamini Shah can be reached on (571) 272-2279. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

SKP


KAMINI SHAH
SUPERVISORY PATENT EXAMINER